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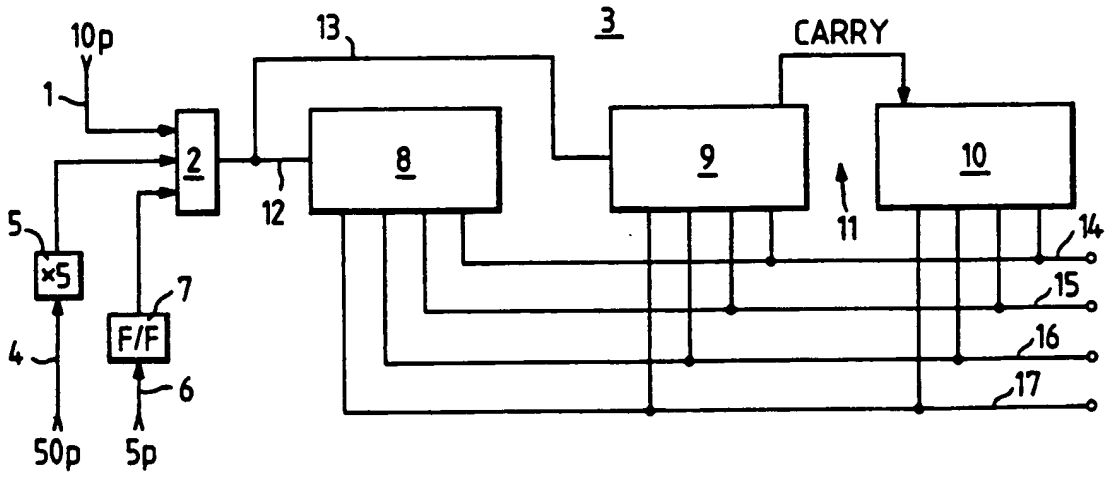
(54) Information storage and retrieval in a coin-operated machine

(57) Apparatus is described for determining details of the internal accountancy of a coin-operated machine, comprising means for detecting movement of coins in and/or through the machine and providing an electrical signal indicating the number and/or value of coins detected, and electrical logic circuitry (3) for receiving the electrical signals and storing the information thus received, the logic circuitry being such that the information stored therein is not lost if there is a break in a mains power supplied to the apparatus. In one embodiment, the apparatus has means (1,4 and 5, 6 and 7) for detecting entry of coins into a cash box of the machine and records the value thereof in non-volatile electrical logic circuitry (8, 9, 10). In an alternative embodiment, the internal microprocessor of the machine detects all details of the internal accountancy of the machine and stores this data in a battery backed up random access memory.

Fig.1.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

Fig.1.

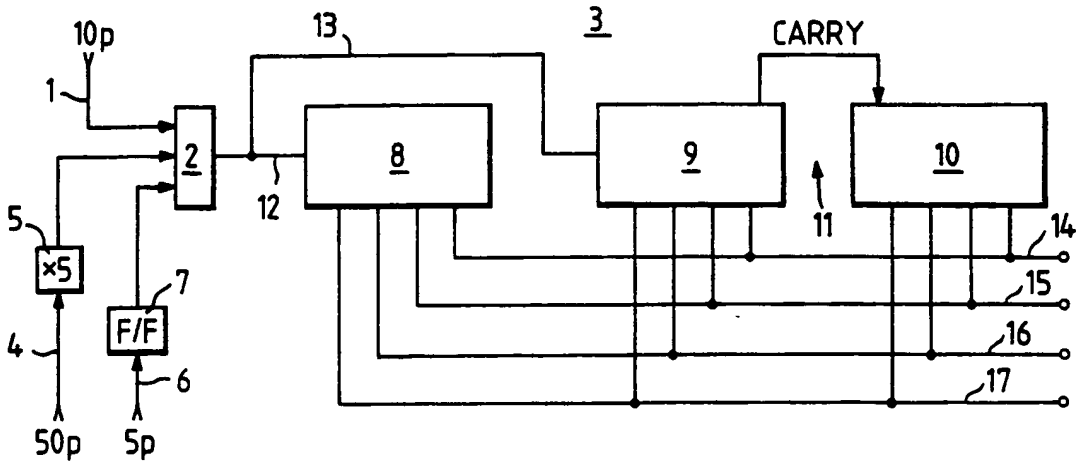

10p
1
13
3
CARRY
2
8
9
10
12
11
5
×5
7
F/F
4
6
14
15
16
17
50p
5p

Fig.2.

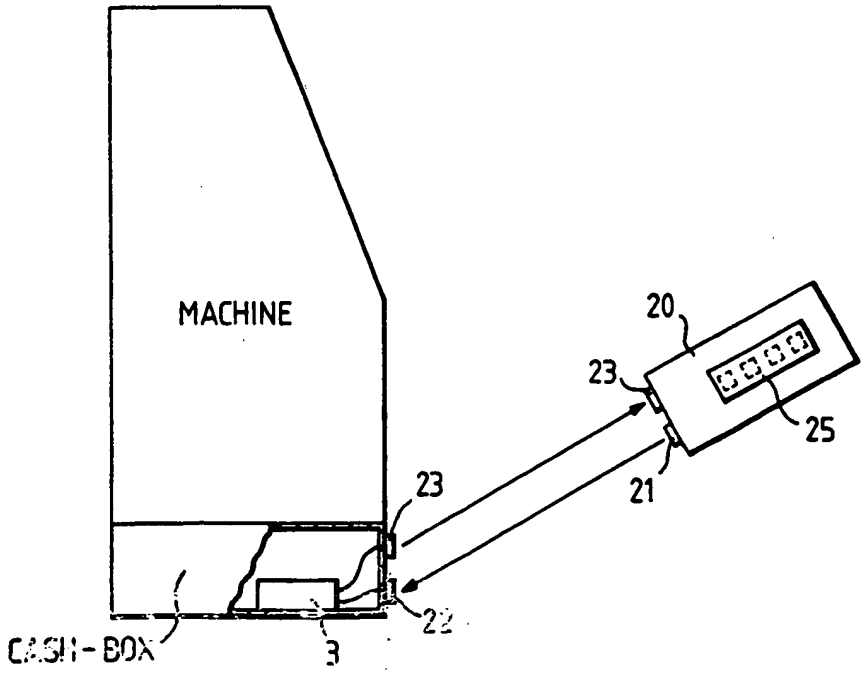

MACHINE
20
23
25
21
23
22
CASH-BOX
3

Fig.3.

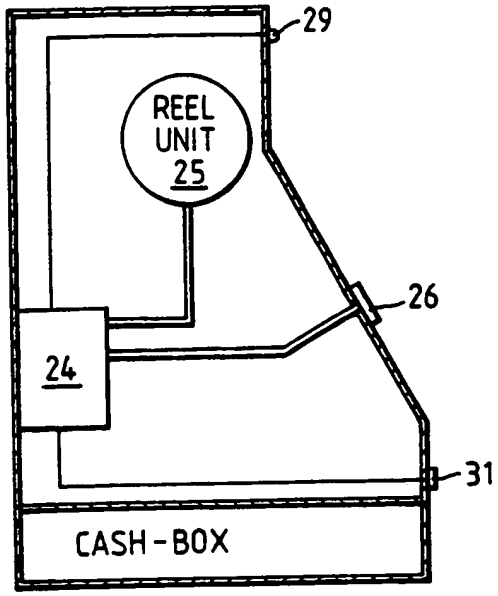
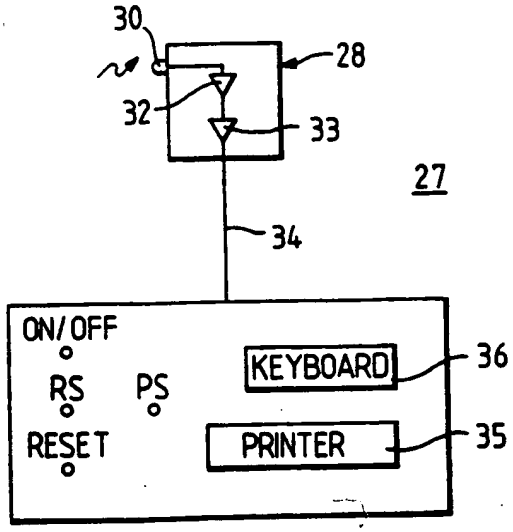

29
REEL
UNIT
25
26
24
31
CASH-BOX

Fig.4.


30
28
32
33
27
34
ON/OFF
RS
PS
RESET
KEYBOARD
36
PRINTER
35

SPECIFICATION

Information storage and retrieval in a coin-operated machine

This invention relates to the storage and retrieval of information in coin-operated machines, for example coin-operated gaming or amusement machines such as so-called fruit machines.

In coin-operated machines, coins inserted by a user into the machine are deposited in a cash-box which is periodially emptied. In the case of a vending machine or a purely amusement machine, all coins inserted into the machine will be immediately deposited in the cash-box. In the case of gaming machines which pay cash prizes, such as fruit machines, inserted coins are used to maintain a store of coins for paying out prizes and are only fed to the cash-box if the payout store is full. In all cases, however, coins once deposited in the cash-box remain there until the cash-box is emptied.

According to one aspect of the invention, there is provided apparatus for determining details of the internal accountancy of a coin-operated machines, comprising means for detecting movement of coins in and/or through the machine and providing an electrical signal indicating the number and/or value of coins detected, and electrical logic circuitry for receiving the electrical signals and storing the information thus received, the logic circuitry being such that the information stored therein is not lost if there is a break in a mains power supplied to the apparatus.

Generally, the detecting means detect the number of coins input to and output from the machine and the number of plays of the machine.

Preferably, the detecting means and logic circuitry are provided in a microprocessor provided in the coin-operated machine and conveniently, the microprocessor also controls operation of the coin-operated machine.

In a preferred embodiment, the apparatus includes transmitter means for outputting the information stored in the form of a coded electromagnetic or acoustic signal in response to an activating signal and a remote readout unit incorporating receiver means for receiving and decoding the coded signal.

In another aspect the invention provides apparatus for recording the value of coins deposited in the cash-box of a coin-operated machine, comprising means for detecting the entry of coins into the cash-box and providing an electrical signal indicative of the value of the deposited coin, and non-volatile electrical logic circuitry for receiving the electrical signals and recording the value of the coins deposited in the cash-box since a given starting time.

In this specification, the term "non-volatile electrical logic circuitry" is used to denote electrical logic circuitry which does not require the assistance of a power source to store information. An example of such logic circuitry is the MNOS NOVOL logic circuitry sold by Plessey.

In one embodiment of the invention, the non-volatile logic circuitry includes a first register for recording the total value of coins deposited in the cash-box since a given starting date, e.g. the date of installation of the machine, and a second register for recording the total value of coins deposited in the cash box since the cash-box was last emptied.

A coin of given value may be selected as the unit of value in which the cash value is recorded and detection of the entry of a unit value coin into the cash-box may result in a single electrical pulse being fed to the logic circuitry. Entry of a coin which is a multiple of the unit value then results in a corresponding number of pulses being fed to the logic circuitry. In the case of a coin which has a value equal to a sub-multiple of the unit value, a number of such coins having a total value equal to the unit value have to enter the cash-box to result in a single pulse being applied to the logic circuitry.

It is a further object of the invention to enable the recorded value of the coins deposited in the cash-box to be read out from the non-volatile logic circuitry.

Accordingly, a printer unit may be provided for plugging into the recording apparatus to print out the recorded cash value.

Alternatively or additionally, a remote readout unit may be provided which emits a coded electromagnetic signal and the recording apparatus may be provided with a transmitter unit responsive to the coded signal to interrogate the logic circuitry and transmit the recorded cash value as an electromagnetic signal to a receiver in the readout unit.

In order that the invention may be readily understood, embodiments thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schemtic diagram of recording apparatus for the cash-box of a coin-operated machine embodying the invention;

Figure 2 diagrammatically illustrate the use of a remote hand-held readout unit for reading out the cash values stored in the recording apparatus of Fig. 1;

Figure 3 is a schematic diagram illustrating an alternative embodiment of apparatus in accordance with the invention; and

Figure 4 illustrates diagrammatically a readout unit for the apparatus of Fig. 3.

Referring firstly to Fig. 1, the recording apparatus shown therein is intended to record the value of coins deposited in a cash-box of a coin-operated machine which accepts 5p, 10p and 50p coins, the 10p coin being selected as the unit of value in which the cash value is

recorded. The illustrated apparatus serves to record a total accumulated value of coins deposited in the cash-box since an initial starting date, such as the date of installation of the machine, and to record a residual total value of coins deposited in the cash-box since the cash-box was last emptied.

Electrical signals denoting the entry of coins into the coin-box are delivered in three channels. In a first channel 1, the entry of a 10p win results in the delivery of a single electrical pulse via an interface 2 to non-volatile electrical logic circuitry 3 for recording the cash value. In a second channel 4, entry of a 50p coin results in the delivery of five electrical pulses to circuitry 3 from a multiplier 5. In the third chanel 6, entry of a 5p coin triggers a non-volatile logic flip-flop 7 which delivers a single electrical pulse to the circuitry 3 for every two 5p coins which enter the cash-box.

The circuitry 3 comprises a first register, in the form of a non volatile decade counter 8, for recording the residual value of coins deposited in the cash-box since it was last emptied, giving a recording capacity of 9,999 units for the residual value. Two interconnected, non-volatile decade counter 9 and 10 constitute a second register 11 for recording the accumulated value of coins deposited in the cash-box since the starting date, giving a recording capacity of 99,999,999 units for the accumulated value. The electrical pulses delivered in the three channels 1, 4 and 6 are delivered to the counting inputs of both register 8 and 11 via respective lines 12, 13. The count outputs of the three decade counters 8, 9 and 10 can be multiplexed onto four output lines 14 to 17 to read out the accumulated value and residual value stored in the counters.

A suitable printer unit (not shown) may be provided for plugging into the recording apparatus, for example by a cash-collector before emptying the cash-box, to print out the recorded values. After emptying the cash box, the first register 8 is reset so as to record the residual cash which enters the cash-box until the cash-box is next emptied.

It is envisaged that the current totals in the first and second registers may also be read out at any time with the aid of a hand-held readout unit 20 as illustrated schematically in Fig. 2. The unit 20 has a transmitter 21 for transmitting a coded electromagnetic (e.g. infra-red or laser light) or ultrasonic signal to a receiver 22 on the machine. The receiver 22 responds to the coded signal by activating readout circuitry in the recording apparatus to interrogate the two registers and deliver the resulting information to a transmitter 23 on the machine which transmits the information to a receiver 23 on the unit 1 by means, for example, of a modulated electromagnetic beam, such as infra-red beam. A microprocessor in the unit 21 processes the received information and displays it on a suitable visual dislay 25 on the unit.

It will be seen that recording apparatus embodying the present invention provides secure storage of the information regarding the value of coins deposited in the cash-box without requiring a power source, such as batteries, to maintain the storage, thereby providing reliable information concerning the cash flow through the machine and enabling any irregularities to be highlighted.

The use of a remote hand-held readout unit to retrieve the information currently recorded in the recording apparatus further enables an interested party to evaluate the status of the cash-box at any time, thereby leading to enhanced operating security.

Fig. 3 illustrates diagrammatically an alternative embodiment of a coin-operated machine embodying the invention. As shown in Fig. 3, operation of the machine, for example operation of a reel unit 25 and player controls 26 where the machine is a fruit machine, are controlled by a microprocessor 24. The microprocessor also establishes the number of coins input to and output from the machine and the number of plays etc. The residual value of the coins deposited in the cash box since it was last emptied and the accumulated value of coins deposited in the cash box since the starting date are also determined by the microprocessor, but of course a separate arrangement similar to that described above in relation to Fig. 1 could be provided.

The information determined by the microprocessor 24 is stored in a battery-backed-up random access memory (RAM) of the microprocessor.

Data stored in the microprocessor or RAM is recovered by an operator using a hand-held or briefcase-held readout unit 27 which is powered by rechargeable batteries and is shown in Fig. 4.

Thus, in order to recover data from the machine, an operator first places a receiver head 28 of the hand or briefcase held readout unit 27 near an electromagnetic radiation (for example infra-red radiation) emitting diode mounted on the front panel of the coin-operated machine, so that any radiation emitted by the diode 28 can be picked up by a receiving diode 30 mounted on the receiver head. The operator having switched on the readout unit then actuates, for example turns, a switch 31 mounted on the front panel of the machine. The state of the switch 31 is monitored by the microprocessor 24 and, in response to actuation of the switch 31, the microprocessor 24 delivers a signal to the gate of an output transistor (not shown) of the microprocessor rendering the transistor, whose emitter is connected to earth, conducting. The collector of the transistor is connected to the cathode of the electromagnetic radiation emitting diode 29 so that, when the

transistor starts to conduct, the diode 29, whose anode is connected to a 15 volt supply, is rendered conducting to produce, in the example described, an infra-red beam which can be picked up by the receiving diode 30.

At the same time, the microprocessor 24 interrogates its internal RAM and delivers a serial encoded signal containing the data stored in the RAM to the cathode of the diode 29 so that the infra-red beam produced by the diode 29 is modulated by the coded signal. The modulated beam is picked up by the receiving diode 30 and then amplified by two amplifiers 32 and 33 provided in the receiver head. A receiver button RS on the main body of the hand or briefcase held readout unit 27 is then activated by the operator and the amplified signal is passed through a flexible cable 34 into the main body of the hand or briefcase held readout unit which contains a microprocessor incorporating an erasable programmable read only memory (EPROM) and a random access memory (RAM) in which the signals input to the readout unit may be stored. The program stored in the EPROM enables the readout unit microprocessor to decode the incoming serial signal from the receiver head and to determine the format of the printout produced by a printer 35 of the readout unit 27 when a print button PS is activated. The program stored in the EPROM is designed to critically analyse the incoming signal so as to reject noise signals which may otherwise distort or mask the data.

A keyboard 36 is provided on the readout unit to enable additional information such as the site number of the machine or the name of the site to be entered on the printout or in the readout unit microprocessor RAM to enable easy identification of the printed out data at a later date. Typically, data from about twenty machines may be read out and stored in the RAM which is provided with a separate battery back-up so that the readout unit main power supply may be switched off without losing the data stored in the RAM. The data stored in the RAM may, of course, be printed out at a later date or in a different place.

Unlike the machine shown in Fig. 1, this alternative embodiment allows all the details of the machine accountancy such as number of coins input to or output from the machine, number of plays, value of coins deposited in the cash box of the machine etc. to be determined and recorded although as described above the apparatus shown in Fig. 1 may be used to determine and record the value of the cash box contents.

In the machine shown in Fig. 3, all information required can be obtained and stored by the internal microprocessor of the machine without the need for separate apparatus. Also, this arrangement provides a high degree of security because the data is encoded by the microprocessor before transmission and can only be decoded by readout unit having a microprecossor incorporating the correct program in its EPROM. Thus, different companies could be provided with different encoding routines to prevent competitors from obtaining data from each others machines. Preferably the fruit machine microprocessor stores the encoding instructions in an erasable programmable read only memory so that these may be modified as desired.

It is envisaged that when non-volatile RAM with good noise characteristics is available, the battery backed-up RAM will be replaced by non-volatile RAM.

CLAIMS

1. Apparatus for determining details of the internal accountancy of a coin-operated machine, comprising means for detecting movement of coins in and/or through the machine and providing an electrical signal indicating the number and/or value of coins detected, and electrical logic circuitry for receiving the electrical signals and storing the information thus received, the logic circuitry being such that the information stored therein is not lost if there is a break in a mains power supplied to the apparatus.

2. Apparatus according to claim 1, wherein the detecting means detect the number of coins input to and output from the machine and the number of plays of the machine.

3. Apparatus according to claim 1 or 2, wherein the detecting means and logic circuitry are provided in a microprocessor provided in the coin-operated machine.

4. Apparatus according to claim 3, wherein the microprocessor also controls operation of the coin-operated machine.

5. Apparatus according to claim 1, 2, 3 or 4, including transmitter means for outputting the information stored in the form of a coded electromagnetic or acoustic signal in response to an activating signal and a remote readout unit incorporating receiver means for receiving and decoding the coded signal.

6. Apparatus for recording the value of coins deposited in the cash-box of a coin-operated machine, comprising means for detecting the entry of coins into the cash-box and providing an electrical signal indicative of the value of the deposited coin, and non-volatile electrical logic circuitry for receiving the electrical signals and recording the value of the coins deposited in the cash-box since a given starting time.

7. Apparatus according to claim 6, wherein the non-volatile logic circuitry includes a first register for recording the total value of coins deposited in the cash-box since a given starting date and a second register for recording the total value of coins deposited in the cash-box since the cash-box was last emptied.

8. Apparatus according to claim 6 or 7, including means for selecting a coin of a given value in which the cash value is to be recorded such that entry of a unit value coin, or coins making up a unit value, into the cash box results in a single electrical pulse being fed to the logic circuitry.

9. Apparatus according to claim 6, 7 or 8, wherein a printer is provided for plugging into the recording apparatus to print out the recorded cash value.

10. Apparatus according to claim 6, 7 or 8, wherein a remote readout unit is provided which emits a coded electromagnetic signal and the recording apparatus is provided with a transmitter unit responsive to the coded signal to interrogate the logic circuitry and transmit the recorded cash value as an electromagnetic signal to a receiver in the readout unit.

11. Apparatus for determining detail of the internal accountancy of a coin-operated machine substantially as hereinbefore described with reference to and as illustrated in Figs. 1 and 2 of the accompanying drawings.

12. Apparatus for determining details of the internal accountancy of a coin-operated machine substantially as hereinbefore described with reference to and as illustrated in Figs. 3 and 4 of the accompanying drawings.

13. Any novel feature or combination of features described herein.

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